

## 7.0 SITE 7 – TORPEDO SHOPS (OU 8)

This five-year review is being conducted for Site 7 at the request of the USEPA. This site is still under investigation under CERCLA. No Decision Documents have been prepared for this site to date.

### 7.1 HISTORY AND SITE CHRONOLOGY

A list of important Site 7 historical events and relevant dates in the site chronology is shown below. The identified events are illustrative, not comprehensive.

Event	Date
Building 325 – torpedo overhaul facility built.	1955
Building 450 – torpedo overhaul/assembly facility built.	1974
Building 325 leach field abandoned.	1975
New leach field used until sanitary sewers installed.	1983
Hazardous waste sump decommissioned.	1987
Visual inspection of Building 325 observed solvents.	1989
Phase I RI completed.	August 1992
Underground No. 2 fuel oil tank closed (one of two) and above ground tank removed under RCRA.	1995
Investigation of two fuel oil tanks and removal action of TPH contaminated soil completed under RCRA.	1996
Phase II RI completed.	March 1997
Draft Final Basewide Groundwater OU RI.	August 2001

### 7.2 BACKGROUND

The Torpedo Shops (Site 7) are located in the northern portion of NSB-NLON on the northern side of Triton Road. Figure 7-1 shows the general site arrangement. The site location with respect to other IR sites at NSB-NLON is shown on Figure 1-2. The site covers approximately 7 acres and is bordered on the east and north by 60-foot-high bedrock cliffs. The remainder of the site slopes to the southwest toward the Area A Downstream Watercourses (Site 3). An earthen berm extends along the base of the eastern portion of the exposed rock face. Three buildings (325, 450, and 477) exist at the site.

Building 325 is a torpedo overhaul facility. It was built in 1955 and had an on-site sanitary septic system until 1983, when all the building's plumbing facilities were connected to sanitary sewers. The original septic leach field for Building 325 is located southwest of the building, adjacent to Triton Road. This leach field became clogged in 1975 and was abandoned. A new leach field (south leach field) was constructed next to the original leach field and was used until sanitary sewers were installed in 1983.

A visual inspection of Building 325 was performed on March 20, 1989. According to interviews with on-site personnel, a variety of fuels, solvents, and petroleum products have been used in the building. Otto Fuel II [which is comprised of propylene glycol dinitrate (76 percent), 2-nitrodiphenylamine (1.5 percent), and di-n-butyl sebacate (22.5 percent) and produces hydrogen cyanide when burned], high-octane alcohol (190 proof grain alcohol), and TH-Dimer (jet rocket fuel) were observed in maintenance areas. Solvents including mineral spirits, alcohol, and 1,1,1-trichloroethane, as well as petroleum products such as motor oil and grease, were used in this building. A sink in one area was previously used for film development, and another sink was used for the overhaul of alkaline batteries. This plumbing drained into the on-site septic system until 1983. A maintenance area has a shallow sump that is covered with a flush-mounted steel grating. The area surrounding this sump was previously a washdown/blowdown area for weapons. This sump drains to the storm sewer system on the west side of Building 325. Two underground No. 2 fuel oil tanks were located on the southern side of this building. One of the tanks was closed in 1995. A third tank, which was located above ground adjacent to the building, was used for temporary storage of No. 2 fuel oil but, based on field reconnaissance, had been removed as of March 15, 1995.

A smaller building attached to the east side of Building 325 was also inspected. It was previously used as an assembly shop for torpedoes and was a paint shop at the time of the inspection. A storage closet in this building included containers of 1,1,1-trichloroethane and methyl ethyl ketone (2-butanone). Drums and cylinders were stored outside on the eastern side of this building. The vessels were labeled as containing propane, isobutane, 2-butanone, xylol, methylene chloride, propellant, and zinc chromate. An addition to the northern side of Building 325 was under construction at the time of the Atlantic inspection and has since been completed. This addition is also used as a torpedo shop.

Building 450 is the primary MK-48 torpedo overhaul/assembly facility. It was built in 1974 and was served by its own septic system until 1983, when it was connected to sanitary sewers. Only domestic wastewater from toilets, lavatories, and showers in Building 450 had been directed to the septic field (north leach field). Torpedo overhaul/assembly operations of Building 450 generate fuels, solvents, and petroleum products as wastes. An Otto fuel and seawater mixture is drained from the torpedoes, which are then replenished with fresh fuel. The IAS report indicated that Building 450 generates approximately 3,000 gallons of Otto fuel wastewater per month. This building was constructed with a waste collection system that collected waste products from floor drains and discharged to an underground waste tank/sump with a capacity of approximately 1,500 gallons. The waste tank was pumped periodically and the contents were disposed off site. Otto fuel product was previously stored in a 4,000-gallon underground tank south of Building 450.

Building 477, approximately 65 feet east of Building 450, was formerly used to store Otto fuel in drums. On-site personnel report that solvents including 1,1,1-trichloroethane, trichloroethene (TCE), toluene, mineral spirits, alcohol, and bulk freon have been used at this facility. Petroleum products including TL-250 motor oil and hydraulic fluid have also been used in this building for torpedo maintenance. In the past, only domestic wastewater from toilets, lavatories, and showers in Building 450 was directed to the septic field (north system).

Atlantic performed an SI of Building 450 on March 20, 1989. The former septic leach field is located southwest of this building in a flat, elevated area. The hazardous waste sump was no longer in use and, reportedly, was decommissioned in 1987. It was replaced with three 1,000-gallon above-ground tanks located south of the building. The floor drains were sealed and replaced with a new system for pumping waste products to the new tanks. A 4,000-gallon above-ground Otto fuel storage tank replaced the previous tank and is located south of the building. No construction is planned for the immediate future at Building 450.

The Phase I RI for Site 7 focused primarily on subsurface soils because the source being investigated at that time was the subsurface leach fields. The investigation began with a soil gas survey of the area surrounding Buildings 450 and 325. These results were used to guide the installation of monitoring wells and the collection of soil samples from the well and test borings. The Phase I RI concluded that there were negligible health risks associated with the Torpedo Shops and that this site should proceed to Step II of the IRP.

During the Phase II RI, minimal contamination was detected in each of the matrices sampled at the Torpedo shop. Samples were obtained of soil, groundwater, surface water, and sediment. Contamination was detected in soil and groundwater at the site that required further characterization; however, relatively low human health and ecological risks are present at the site. Minimal exceedances of state criteria were observed for sediment, and no chemicals detected in surface water exceeded the state human health AWQC for the consumption of organisms and/or water and organisms.

Phase II RI sampling results included notable detections of contamination in soil and groundwater near the abandoned leach field. A human health risk assessment showed that non-cancer risks were below acceptable levels except for the construction worker and future resident, and cancer risks were below acceptable levels except for a hypothetical future resident. The Phase II RI recommended that further characterization of the Torpedo Shops be completed before determining whether or not the site should proceed to the FS stage.

The objectives of the Basewide Groundwater OU RI at Site 7 were to further characterize the nature and extent of soil and groundwater contamination in the vicinity of the abandoned septic system and to quantify the risks to human receptors from the soil and groundwater. Organic contaminant detections in soils were scattered and were primarily PAHs. Metals detections above background were scattered and were in general only slightly above the background concentrations. Of the seven metals identified as COPCs based on screening criteria, only three were also COPCs for groundwater, and only one of these three was detected in groundwater at a concentration above screening criteria (chromium, in one well), indicating that soils are not impacting groundwater to any significant degree. Groundwater sampling results for the Torpedo Shops indicate that there are only sporadic, low-concentration detections of contaminants in site monitoring wells. A small plume of chlorobenzenes was detected west of Building 325, but there were no other discernable contaminant plumes of any size, indicating that there are no significant sources leaching contamination to groundwater at Site 7. Several wells located within the western portion of Site 7 had several MCL exceedances in groundwater; however, the exceedances varied from well to well. Aside from three exceedances of the MCL for bis(2-ethylhexyl)phthalate and two exceedances for TCE, no compound was detected above the MCL in groundwater more than once. A preliminary evaluation of natural attenuation indicated that biodegradation is not a significant natural attenuation process that is acting to reduce organic contaminant concentrations. Because of this information, it was not recommended that a monitored natural attenuation alternative be pursued for the Torpedo Shops.

Cumulative carcinogenic and noncarcinogenic risks posed by exposure to soils at Site 7 were either less than or within USEPA and CTDEP acceptable risk ranges, indicating that soils do not pose an unacceptable risk via direct contact exposures. The HHRA determined that risks posed by exposure of construction workers to groundwater at Site 7 are within USEPA and CTDEP acceptable levels, assuming that the workers are exposed to the maximum observed concentrations of site contaminants. The HHRA evaluated future residential groundwater usage, and calculated risks were marginally above the acceptable risk range based on maximum concentrations. The groundwater, however, is classified by CTDEP as GB groundwater (i.e., not suitable for direct human consumption without treatment) and it is not expected that it will be used for human consumption in the foreseeable future.

Because the risks associated with Site 7 soil are within USEPA and CTDEP acceptable risk ranges, an FS is not necessary for the soil OU at Site 7. An NFA Decision Document should be prepared for this OU. Additionally, since surface water concentrations were acceptable, an FS is not necessary for this OU. However, even though contaminant concentrations were generally low and risks are acceptable under the current land use scenario, it is recommended that an FS be prepared for the groundwater OU associated with Site 7. Additionally, sediment contamination documented in the Phase II RI has not been

further addressed. The FS should evaluate, at a minimum, land use controls and monitoring for the site. This recommendation is made for the following reasons:

- The contaminant source areas are not fully understood, but the current groundwater data (i.e., extent of contamination and concentrations) do not indicate that the sources are significant and further investigation is warranted to completely characterize them.
- A limited groundwater monitoring program would verify the trend in groundwater contaminant concentrations and determine the impact of any changes in site/source area conditions in the future.
- A change in land use would potentially result in unacceptable risks to potential receptors.

### **7.3 REMEDIAL ACTIONS**

#### **7.3.1 Remedy Selection**

A final remedy has not been selected or implemented for any media at Site 7. A small soil removal action was completed under RCRA at the Torpedo Shops to address total petroleum hydrocarbon (TPH) contamination related to an underground storage tank (UST). This removal action was performed under the CTDEP RCRA UST Program and not CERCLA. Soil adjacent to Building 325 with TPH concentrations in excess of 500 mg/kg was excavated and disposed at an off-site location.

The Basewide Groundwater OU RI recommends NFA for the soil at Site 7; however, an FS is recommended to evaluate the groundwater operable unit associated with the site. The FS should evaluate, at a minimum, land use controls and monitoring for the site. Surface water and sediment samples collected in the vicinity at the Torpedo Site revealed only minimal contamination.

#### **7.3.2 Remedy Implementation**

A final remedy has not yet been chosen for Site 7. An FS is planned for final submittal in March 2002 and a PRAP/ROD will be submitted in December 2002.

### **7.4 FIVE-YEAR REVIEW FINDINGS**

#### **7.4.1 Site Inspection**

A site inspection conducted at Site 7 on April 11, 2001 included visual observations of the areas surrounding Buildings 450 and 325. Conditions during the inspection were favorable, with mild temperatures and no precipitation. The flush-mount groundwater monitoring wells located within the

parking lot and the grassy area west of Building 325 were inspected and found to be in good condition. No visual signs of contamination or notable signs of impacts from the site were observed.

Site 7 is located within a high-security gated area. The area consists of buildings, parking lots, and grassy areas. There is no short-term or long-term plan to convert this area to any other use. Appendix A contains photographs taken of the site during the site inspection.

#### **7.4.2 Document and Analytical Data Review**

The Phase II RI and BGOURI report were reviewed for this five-year review. The Phase II RI recommended further investigation of Site 7. The Navy subsequently investigated the soil and groundwater at the site during the Basewide Groundwater OU RI. Based on the results of the Basewide Groundwater OU RI, it was recommended that a NFA decision document be prepared for the soil OU and a FS be prepared for the groundwater OU.

#### **7.4.3 ARAR and Site-Specific Action Level Changes**

A ROD has not been signed for Site 7, and therefore it cannot be determined at this time if the remedial actions are protective of human health and the environment.

Also, since a ROD has not been signed for Site 7, ARARs and site-specific action levels were not reviewed to determine if there is a question on the protectiveness of the remedy.

### **7.5 ASSESSMENT**

A final remedy has not been implemented at Site 7, so conclusions cannot be made to support the determination that the remedy at Site 7 is protective of human health and the environment. The results of the Phase II RI and the BGOURI do not indicate any imminent threats to human health or the environment. The Navy has an IR Site Use Restriction instruction in place as of October 2000 at NSB-NLON [SOPA (ADMIN) NLONINST 5090.18]. The policy restricts to ground surface disturbance of soils or any subsurface disturbance of soils and/or groundwater at IR sites.

### **7.6 DEFICIENCIES**

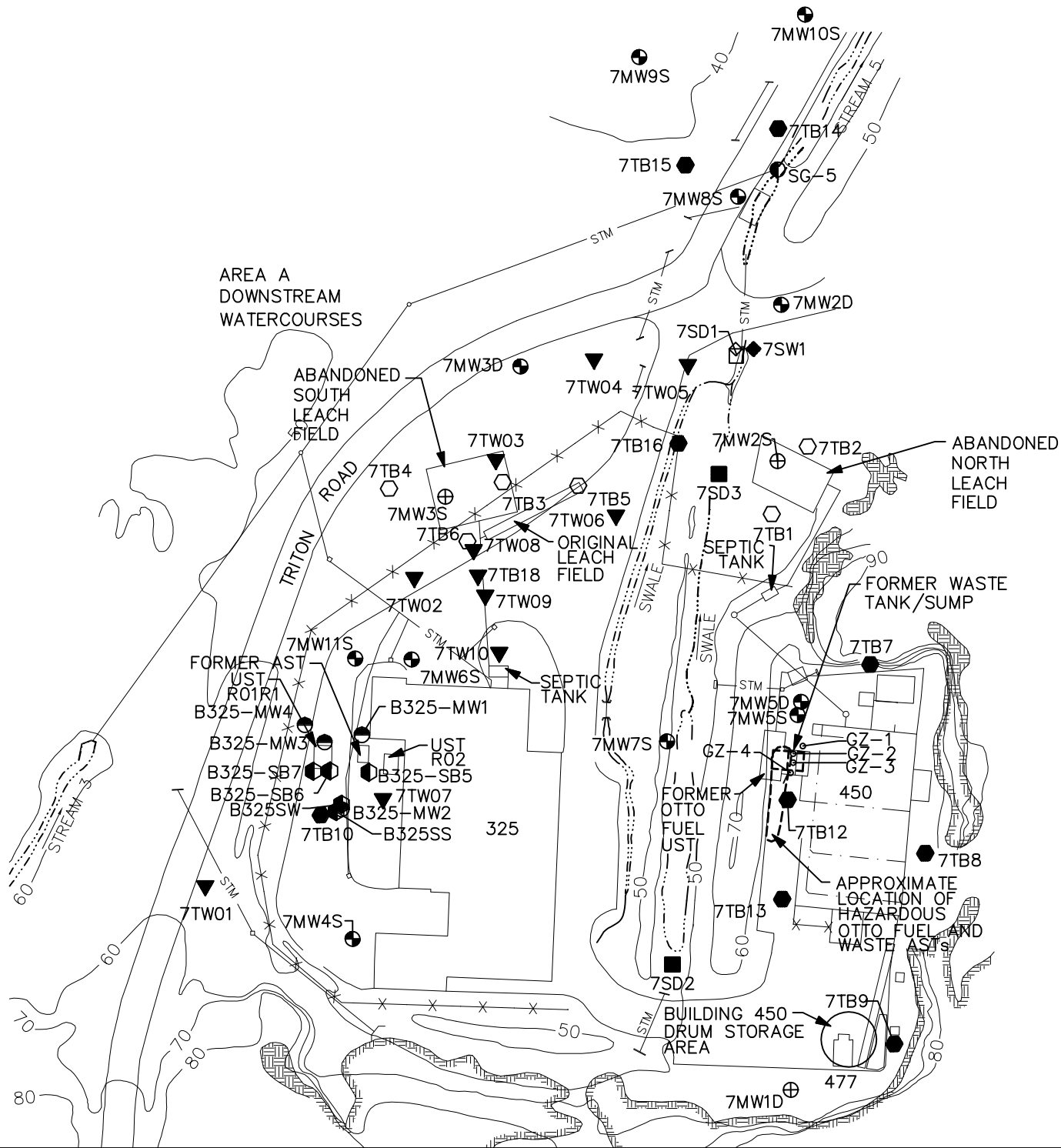
A final remedy has not been implemented at Site 7, subsequently no deficiencies were able to be identified during this review.

## **7.7 RECOMMENDATIONS AND REQUIRED ACTIONS**

It is recommended that an NFA Decision Document be prepared for the soil, sediment, and surface water OUs at Site 7. It is recommended that an FS be prepared for the groundwater OU associated with Site 7. In addition, it is recommended that there be enforcement of the IR Site Use Restriction instruction.

## **7.8 PROTECTIVENESS STATEMENT**

A remedy for Site 7 has not yet been selected by the Navy, USEPA, and CTDEP. The results of the Phase II RI and the BGOURI do not indicate any imminent threats to human health or the environment. Because there are potential risks associated with the contaminant concentrations detected in the groundwater under future land use scenarios, the IR Site Use Restriction instruction [SOPA (ADMIN) NLONINST 5090.18] should continue to be enforced while the FS for groundwater is prepared to determine appropriate remedial measures. The draft FS for this site is scheduled for 2002.




- NOTES**
- 1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE.
  - 2. BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB-NLON AND PHASE II RI WORK PLAN.

**LEGEND**

- ⊕7MW2S PHASE I MONITORING WELL
- ⊕7MW7S PHASE II MONITORING WELL
- B325-MW1 SITE CHARACTERIZATION MONITORING WELL
- 7TB1 PHASE I TEST BORING
- 7TB12 PHASE II TEST BORING
- B325-SB6 SITE CHARACTERIZATION SOIL BORING
- ◇7SW1 PHASE I EXISTING SURFACE WATER SAMPLE
- ◆7SW1 PHASE II SURFACE WATER SAMPLE
- 7SD1 PHASE I SEDIMENT SAMPLE
- 7SD3 PHASE II SEDIMENT SAMPLE
- SG-5 PHASE II STAFF GAUGE
- ▼7TB17 GROUNDWATER OU RI TEST BORING LOCATION
- ▼7TW02 GROUNDWATER OU RI TEMPORARY WELL
- 10— TOPOGRAPHIC CONTOUR
- 123 BUILDING No.
- WATERCOURSE
- STM— STORM SEWER AND CATCH BASIN
- Exposed Bedrock
- ×× FENCE

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SCALE IN FEET

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							SCALE			DRAWING NO.	REV.
							AS NOTED			FIGURE 7-1	0
							SITE MAP SITE 7 - TORPEDO SHOPS NSB-NLON, GROTON, CONNECTICUT				



## **8.0 SITE 8 – GOSS COVE LANDFILL (OU 5)**

This five-year review of Site 8 – Goss Cove Landfill is required by statute because hazardous substances, pollutants, or contaminants remain on site that do not allow for unlimited use or unrestricted exposure. The remedial action for the Site 8 soil OU (i.e., installation of an engineered cap system) began in September 2000 and was completed in June 2001. The groundwater OU for this site is still being investigated under CERCLA. Additional data must be collected to fully assess the impact of the remedial action. A groundwater monitoring program will be completed over the next five years so that a more detailed review of the site can be completed during the Second Five-Year Review.

### **8.1 HISTORY AND SITE CHRONOLOGY**

A list of important Site 8 historical events and relevant dates in the site chronology is shown below. The identified events are illustrative, not comprehensive.

<b>Event</b>	<b>Date</b>
Landfill operations.	1946 to 1957
Final IAS completed.	March 1983
Phase I RI completed.	August 1992
Phase II RI finalized.	March 1997
Proposed Plan for soil and sediment issued.	June 1999
Public Meeting conducted.	June 1999
FS for soil and sediment issued.	September 1999
ROD for soil and sediment signed.	September 1999
Remedial Design for soil began.	October 1999
Remedial Action for soil began.	September 2000
Remedial design for soil completed.	November 2000
Final Groundwater Monitoring Plan for Goss Cove issued.	March 2001
Remedial Action for soil completed.	June 2001
Draft Final Basewide Groundwater OU RI completed.	August 2001
Groundwater Monitoring Program initiated.	TBD

### **8.2 BACKGROUND**

The Goss Cove Landfill (Site 8) is located in the southwestern corner of NSB-NLON, adjacent to the Thames River. It is west of Shark Boulevard and the intersection of Crystal Lake Road and Military Highway, east of the Thames River, and north of Goss Cove. Figure 8-1 displays the general site arrangement. The landfill encompasses approximately 3.5 acres. The Nautilus Museum and a paved

parking lot are constructed directly over the site of the former landfill. The Nautilus Museum is a submarine museum operated by the Navy and is open to the public.

The IAS Report (NEESA, 1983) indicated that the Goss Cove Landfill was operated from 1946 through 1957. Incinerator ash and inert rubble were disposed at the site, in what was then the northern portion of Goss Cove. It is not known if any other materials were disposed in the former landfill. It has been reported that several large compressed gas cylinders were uncovered during the excavation of a utility trench in the parking area north of the Nautilus Museum building. One of the cylinders was leaking propane, one was filled with ammonia, and the others were empty.

In a 1934 aerial photograph, the limits of Goss Cove appeared to be open water with no evidence of fill. Railroad tracks are shown in the photograph at the same location as they are currently, between the cove and the Thames River. In 1951 aerial photographs, the fill extended to the south to approximately the location of an access driveway to the museum. The 1965 aerial photographs show the landfill extending to the present limit of encroachment on Goss Cove. Aerial photographs from 1965, 1970, 1975, and 1980 show cars parked on the landfill surface. In 1986 photographs, the Nautilus Museum is present on the southern limits of the landfill and a paved parking area extends over the remaining limit of the landfill to the north. Construction of the Nautilus Museum was completed in 1985. Construction of an addition to the Nautilus Museum was completed in 2000.

The boring logs generated during the construction of the Nautilus Museum indicated the presence of fill material consisting of cinders, metal, brick, glass, and sand and gravel to a depth of 15 feet. Beneath the fill is a layer of organic silt that is approximately 10 to 15 feet thick. This material is presumably the sediment bottom of the former cove. The silt is underlain by fine sand to depths ranging from 25 to 100 feet below the surface. The thickness of overburden increases from east to west, toward the river.

A two-phase RI was conducted to determine the nature and extent of contamination at the Goss Cove Landfill. The Phase I RI field investigation, conducted from 1990 to 1992 (Atlantic, 1992), consisted of a soil gas survey, test borings, monitoring well installation, and soil, surface water, and groundwater sampling. Overburden monitoring wells were installed within the former landfill and groundwater samples were obtained. One surface water sample was collected in the Thames River downstream of the landfill. The RI recommended that the site proceed to Step I of the IRP and additional investigations be conducted at the site.

The Phase II RI field investigation was conducted from 1993 to 1995 (B&RE, 1997a). This investigation included the collection of surface and subsurface soil samples from well borings. Surface and subsurface soil samples were also collected from test borings. Shallow and deep monitoring wells were installed.

Groundwater samples were collected from the Phase I and Phase II monitoring wells during each of two rounds of sampling. Surface water and sediment samples were also collected during the Phase II RI. Surface water samples and sediment samples were collected from the perimeter of Goss Cove. Additional sediment sampling was conducted in Goss Cove to perform a supplemental toxicity identification evaluation. Three rounds of air sampling were performed. Air samples were collected from within and around the Nautilus Museum.

Full-time employee, older child trespasser, construction worker, and future resident were evaluated as potential human receptors in the site-specific HHRA completed during the Phase II RI. The results of the risk assessment showed that no unacceptable human health risks are associated with exposure to various media, based on exposure to average contaminant concentrations. All estimated Hazard Indices (HIs) for incidental ingestion, inhalation, and dermal contact with contaminated media are less than 1.0. All estimated incremental lifetime cancer risks (ILCRs) for these exposure routes are within the USEPA target risk range and less than the cumulative CTDEP target risk of  $1.0\text{E-}05$ . Human health risks were also calculated under conditions involving exposure to maximum contaminant concentrations [i.e., the reasonable maximum exposure (RME) scenario] for all potential human receptors. Estimated HIs for the construction worker, older child trespasser, and future resident exceeded 1.0. Elevated risks for the construction worker were primarily attributable to tetrachloroethene (PCE) in groundwater, and risks for the future resident were primarily attributable to PCBs, arsenic, and antimony in soil. Estimated ILCRs for the full-time employee, older child trespasser, construction worker, and future resident all exceeded Connecticut's cumulative target cancer risk of  $1.0\text{E-}05$ . Except for the construction worker, elevated risks were associated with soil ingestion resulting from exposure to PAHs and arsenic. An additional exposure route of concern is dermal contact with groundwater for the construction worker. PCE is the main contributor to the carcinogenic risks for dermal contact with groundwater. Quantitative risks associated with exposure to ambient air at the Nautilus Museum were calculated for a full-time employee under RME conditions only. The estimated HI (0.28) was significantly less than unity for a full-time employee. The cumulative ILCR ( $1.0\text{E-}05$ ) was within the USEPA and CTDEP acceptable risk range.

Results of the Phase II RI ERA, conducted on samples of surface water and sediments collected in the cove, indicated that several inorganics and organic compounds (i.e., metals and pesticides) were found at concentrations in excess of benchmark values protective of aquatic biota, suggesting that aquatic biota inhabiting the cove could be adversely impacted. In response to the results of the studies conducted during Round I of the Phase II RI, additional sampling was conducted in Goss Cove during the supplemental ecological sampling round. The results indicated that four COCs (aluminum, copper, nickel, and heptachlor) were present in surface water at concentrations that represent a potential risk to aquatic biota. A number of chemicals also had Hazard Quotients (HQs) greater than 1.0, suggesting that benthic macroinvertebrates were potentially at risk. The results of toxicity tests confirmed that chemicals present

in this sample were biologically available in concentrations that could adversely impact aquatic biota. Results of the simultaneous extracted metals/acid volatile sulfide (SEM/AVS) analyses conducted to determine the biological availability of copper, cadmium, nickel, lead, and zinc, demonstrated that these five metals are not biologically available.

A Data Gap Investigation (DGI) was conducted in January 1997 (B&RE, 1997c) to determine the source of the PCE contamination detected in the groundwater samples collected during the Phase II RI. The DGI concluded that the source of PCE contamination detected in the groundwater is off site and upgradient of the site, and is possibly a neighboring dry cleaning establishment.

As part of the FS evaluation of remedial strategies for Goss Cove sediment and surface water, a desktop modeling effort was performed to evaluate the potential for migration of COCs from the former Goss Cove Landfill into Goss Cove (TtNUS, 1999e). Modeling was performed for two migration pathways; surface water runoff and groundwater movement. For each of these pathways, two scenarios were evaluated, including existing site conditions and future site conditions after placement of an impervious cap over the former Goss Cove Landfill. Results of this modeling effort showed that migration of COCs is unlikely to occur in the future from the former Goss Cove Landfill to Goss Cove.

A Wetlands Functions and Values Assessment (TtNUS, 1998) was completed to evaluate if the ecological stress in the Goss Cove water body was a result of natural conditions or due to migration from other NSB-NLON sites. This study evaluated the marginal cove vegetation in terms of its ecological functions and values and identified the wetland species associated with the fringing belt. A detailed vegetation inventory was conducted of the taxa that included an inventory of all species of vascular plants present above mean high tide and an examination of the biota associated with the intertidal zone. The results of this assessment concluded that the contrast between the Thames River and cove side is dramatic due to the lack of tidal flushing. Although some tidal action occurs within the cove, it does not appear adequate to aid in supporting a rich viable intertidal algal population and invertebrate biota. This may be related to water quality, since it appears that estuarine organisms can and have become established in the cove in the past but have failed to thrive.

Because the Phase II RI ERA showed potential risks to ecological receptors from Goss Cove sediment, further investigation and evaluation of the sediment were completed by the Navy. An Evaluation of Chemical and Toxicological Data study was conducted in 1998 (SAIC, 1998) to evaluate chemical and toxicological relationships for sediments in Goss Cove. The objective of the study was to establish toxicological response relationships to contaminants in Goss Cove sediments, describe the extent of ecological risks associated with chemical contaminants in Goss Cove sediments, and identify risks for biological effects. Based on data needs, 10 stations were sampled for chemical, toxicological, and

Toxicity Identification Evaluation (TIE). The TIE involves chemical manipulation of the sediment to separate contaminant classes. The TIE employed three manipulations, including C18 column extraction, EDTA chelation, and an aeration/ulva treatment. These three steps remove organic compounds, metals, and hydrogen sulfide/ammonia, respectively. The study supports the conclusion that a complete pathway does not exist between contaminants and observed ecological effects. It may be possible to improve benthic habitat quality by reducing the hypoxic conditions in the cove, thereby reducing the ammonia concentrations that appear to cause depauperate aquatic community.

The Phase II RI showed potential risks to human receptors from exposure to groundwater. To further evaluate these potential risks, a draft final Basewide Groundwater OU RI was completed (TtNUS, 2001e). The Basewide Groundwater OU RI recommended that the Navy complete the soil OU remedial action, implement land use controls, and begin the Groundwater Monitoring Plan as soon as the action is finalized. It was recommended that the decision for preparation of a FS for the groundwater OU at Goss Cove Landfill be postponed until site conditions stabilize and the groundwater monitoring program determines the trends in groundwater contaminant concentrations. If the results of the monitoring program support that there are no unacceptable risks to human health or the environment, then an FS will not be prepared and the Navy will pursue an NFA ROD for the groundwater OU. If the results suggest that further actions are required, then the Navy will prepare an FS for the groundwater OU to develop appropriate remedial alternatives.

### **8.3 REMEDIAL ACTIONS**

A ROD (TtNUS, 1999f) was signed for the soil and sediment OUs at Site 8. Based on the ROD, a remedial action is required for the soil OU and no further action is required for the sediment OU. The following sections describe the remedial action for the soil OU at Site 8.

The results of the RI and FS concluded that surface water associated with Site 8 did not pose any unacceptable risks to potential human or ecological receptors. However, no decision document has been prepared to document the NFA decision for the surface water OU. This OU is not addressed in this five-year review.

The groundwater OU at Site 8 is still being investigated under CERCLA, and final recommendations for the OU will be determined when sufficient data are collected during the Groundwater Monitoring Program. A thorough review of the groundwater OU cannot be performed in this report, but it will be completed in the second five-year review.

### 8.3.1 Remedy Selection

Based on ARARs and risk assessment results, the following RAOs were selected for the soil OU at Goss Cove Landfill:

- Protect potential receptors (i.e., full-time employee, construction worker, older child trespasser, and future resident) from exposure to contaminated soil.
- Prevent unacceptable risk to ecological receptors in the Thames River and Goss Cove from potential migration of contaminants.

To meet the RAOs, the presumptive remedy of containment was selected for the soil OU. The basis for use of the presumptive remedy was the guidance document entitled Application of the CERCLA Municipal Landfill Presumptive Remedy to Military Landfills (Interim Guidance) (USEPA, 1996b). A summary of the key decision points are provided below.

- Based on the available information on Goss Cove Landfill, the waste/fill is heterogeneous, consisting of ashes, cinders, and inert debris such as glass, brick, wood, etc. The wastes are mainly non-hazardous debris, which can be considered as municipal wastes. The contamination mainly consists of PAHs and inorganic compounds that can be attributed to incomplete combustion of fossil fuel and to incinerator ash. The effectiveness of either above-ground treatment for physical separation of the wastes from the fill or in-situ treatment for removal of contaminants is limited because many different treatment processes would be required to address various heterogeneous constituents in the landfill. In addition, due to the large volume of fill material (107,000 cubic yards), such treatment would not be cost effective. As indicated by fate and transport modeling results, the contaminants from the landfill are not currently migrating via the groundwater pathway, and because a majority of the surface of the existing landfill is paved, none of the contaminants are likely to migrate via surface soil erosion.
- The landfill site is currently serving as a museum and a parking lot. The land use in the foreseeable future is expected to remain the same.
- The available historical information suggests that no military munitions were disposed at this landfill.
- The estimated volume of waste/fill, 107,000 cubic yards, exceeds 100,000 cubic yards, which is typically considered to be the limit for an excavation remedy to be suitable.

The selected remedy for the soil and waste/fill material within the Goss Cove Landfill consisted of containment using an engineered control cap, institutional controls, groundwater monitoring, operation and maintenance (O&M), and five-year reviews. The remedy also included the replacement of a storm sewer system that consisted of three 42-inch-diameter corrugated metal pipes (CMPs) that served the southern portion of NSB-NLON and the Goss Cove Landfill parking lot and surrounding area. The existing storm sewer pipes were under-sized and in a deteriorated condition. A 4-foot by 10-foot reinforced concrete box culvert was selected for the new storm sewer system.

Under the selected remedy, the grass-covered areas around the Nautilus Museum were to be excavated and handled in accordance with all applicable environmental laws and regulations. If visual evidence or instrument readings indicate that hazardous constituents may be present, the soil was to be tested for hazardous characteristics. The excavated soil was to be spread over the landfill and compacted. The excavated area was to be backfilled and capped by the placement of a soil-type multi-layered cap consisting of the following components in ascending order: (1) a geonet gas collection layer, (2) a synthetic membrane with a maximum permeability of  $10^{-6}$  centimeters/second (cm/sec), (3) coarse sand for drainage, (4) a geotextile layer for separation, (5) a layer of fill as a root-penetration zone, and (6) a layer of top soil cover with vegetation. The grass islands in the parking lot were also to be capped with a similar multi-layered soil-type cap overlying the compacted layer of waste.

An asphalt-type multi-layered cap was to be placed over compacted waste on the paved areas. The cap was to consist of the following components in ascending order: (1) a geonet gas collection layer, (2) a synthetic membrane having a maximum permeability of  $10^{-6}$  cm/sec, (3) a layer of coarse sand for drainage, (4) a geotextile layer for separation, (5) a layer of gravel sub-base, and (6) a layer of asphalt paving material. The geonet gas layer, geomembrane layer, drainage layer, and the bottom geotextile layer were to be common throughout the parking lot including the grass islands.

Institutional controls were to be recorded in the Base IR Instruction to restrict or control future activities at the site so that potential receptors are not adversely affected. If the Navy leases or transfers title to the property, thereby creating a lease or deed, restrictions would be included in the transfer document to notify future owners of the risk of potential exposure to the contaminants under the cap and the prohibitions on residential development or disruption of the cap. In addition, Environmental Land Use Restrictions (ELURs) would be recorded on the property according to applicable state and local requirements.

Periodic maintenance of the cap was to be performed under the selected remedy. Appropriate material components were to be included in the design of the asphalt layers to reduce the extent of reflective cracking and minimize maintenance of the asphalt-type cap. Maintenance of the soil-type cap was to

include care for the vegetation on the soil cover. Periodic grading and drainage maintenance were to be completed for both types of caps.

Finally, long-term monitoring of groundwater was to be conducted as part of the selected remedy to ensure that contaminant migration is not occurring. Five-year site reviews of the remedy were also to be completed because wastes will remain on site.

### **8.3.2      Remedy Implementation**

The Remedial Design for the soil OU began in October 1999. Additional field work (i.e., field survey, geotechnical field investigation, and geotechnical laboratory testing program) was conducted to collect the necessary data to complete the design. The remedial design was completed in phases (e.g., 30%, 100%, and bidding document). The Remedial Design for the Goss Cove Landfill was finalized in November 2000 (TtNUS, 2000e). Based on comments received from the USEPA and normal refinement of details during the design, the cap components included in the final design were slightly different than the components presented in the ROD. A comparison of the components is provided below.

#### **Grass Covered Areas**

<b>Cap Components in Grass-Covered Areas In ROD</b>	<b>Cap Components in Grass-Covered Areas in Final Design</b>
<ul style="list-style-type: none"> <li>• Geonet gas collection layer</li> <li>• Synthetic membrane (maximum permeability of <math>10^{-6}</math> cm/sec)</li> <li>• Coarse sand drainage layer</li> <li>• Geotextile Layer</li> <li>• Layer of fill as a root-penetration zone</li> <li>• Layer of top soil cover with vegetation</li> </ul>	<ul style="list-style-type: none"> <li>• Gas management layer (6-inch thick select waste/fill and 24-ounce/square yard non-woven geotextile)</li> <li>• 60-mil smooth linear low-density polyethylene (LLDPE) geomembrane</li> <li>• Geosynthetic drainage layer (geonet with non-woven geotextile on either side)</li> <li>• 12-inch-thick subbase layer</li> <li>• Non-woven geotextile</li> <li>• 6-Inch-thick base course layer</li> <li>• Non-woven geotextile</li> <li>• 6-Inch-thick select fill material layer</li> <li>• 6-Inch-thick vegetative cover layer</li> </ul>

#### **Asphalt-Covered Areas**

<b>Cap Components in Asphalt-Covered Areas In ROD</b>	<b>Cap Components in Asphalt-Covered Areas in Final Design</b>
<ul style="list-style-type: none"> <li>• Geonet gas collection layer</li> <li>• Synthetic membrane (maximum permeability of</li> </ul>	<ul style="list-style-type: none"> <li>• Gas management layer</li> <li>• 60-mil smooth LLDPE geomembrane</li> </ul>



Cap Components in Asphalt-Covered Areas In ROD	Cap Components in Asphalt-Covered Areas in Final Design
10 <sup>-6</sup> cm/sec)	
<ul style="list-style-type: none"> <li>• Coarse sand drainage layer</li> <li>• Geotextile layer</li> <li>• Gravel subbase layer</li> <li>• Asphalt paving material layer</li> </ul>	<ul style="list-style-type: none"> <li>• Geosynthetic drainage layer</li> <li>• 12-inch-thick subbase layer</li> <li>• Woven geotextile</li> <li>• 6-Inch-thick base course layer</li> <li>• 3-Inch-bituminous concrete surface layer</li> </ul>

The Navy's RAC began preliminary construction activities at the site in September 2000. The Navy's RAC completed installation of the new storm sewer system and the engineered cap system in June 2001. The Final Report for the remedial action at Goss Cove Landfill is currently being prepared. Details from the report (i.e., actual construction details and QA/QC procedures) will be provided in the second Five-Year Review.

The Navy's cost estimate for implementation of the remedial design was approximately \$3,300,000. The approximate total cost of the remedial action was \$5,500,000. The changes in cost were associated with modifications to the storm sewer system, accelerated work schedules, and landscaping.

Other components of the remedial action, including long-term monitoring and O&M, are discussed below in Section 8.3.3.

To meet the land use control requirements in the ROD, the Navy has prepared and implemented an instruction [i.e., SOPA (ADMIN) New London Instruction 5090.18, (Navy, 2000b)] to restrict use at IR sites at NSB-NLON. The instruction defines the Navy's policy regarding ground surface disturbance of soils or any subsurface disturbance of soils and/or groundwater at IR sites.

### 8.3.3 System Operations/Operation and Maintenance

The Navy will begin to conduct long-term groundwater monitoring at Site 8 in the near future. It is anticipated that the monitoring will begin in the winter of 2001. The long-term groundwater monitoring will be conducted in accordance with the final Groundwater Monitoring Plan that was issued in March 2001 (TtNUS, 2001c). Annual costs associated with long-term monitoring were estimated to be approximately \$208,000. This cost assumes quarterly monitoring, data validation, and reporting. Because this cost estimate was prepared before the Groundwater Monitoring Plan was finalized, it does not account for the complete analytical parameter list included in the final plan. Revised costs will be provided in the second Five-Year Review Report when actual costs of long-term groundwater monitoring will be available.

The Navy will also prepare and implement an O&M plan for Site 8. Annual costs associated with O&M were estimated in the ROD to be approximately \$5,500. It is likely that actual O&M costs will vary from this estimate. Actual O&M costs will be provided in the second Five-Year Review Report.

## **8.4 FIVE-YEAR REVIEW FINDINGS**

### **8.4.1 Site Inspection**

A site inspection was conducted at Site 8 on April 10, 2001. Weather conditions during the inspection were favorable, with mild temperatures and no precipitation. Representatives from the Navy, USEPA, CTDEP, TtNUS, and Foster Wheeler participated in the inspection.

The site inspection included visual observations of the current status of the construction of the engineered landfill cap system at Site 8. At the time of the inspection, the RAC had completed installation of the new storm sewer system and grading of landfill material. The RAC had also begun to install the various layers of the cap system at the northern end of the site and was working toward the southern end. Appendix A contains photographs taken of the site during the site inspection and two subsequent site visits.

A site inspection checklist was completed during the inspection. The completed checklist is provided in Appendix B.

The land use for the site will remain unchanged after the remedial action is completed. The Navy will continue to use the area for a museum and parking lot for the museum.

### **8.4.2 Document and Analytical Data Review**

The documents that were reviewed for this five-year review are listed below, and key information obtained from the documents is summarized in the following paragraphs. Because the groundwater monitoring program for Site 8 has not been implemented yet, no analytical data are available for review.

- FS for Goss Cove Landfill (Site 8) Soil OU
- ROD for Site 8 Goss Cove Landfill Soil and Sediment
- Bidding Documents Submission of the Remedial Design for Goss Cove Landfill
- SOPA (ADMIN) New London Instruction 5090.18
- Groundwater Monitoring Plan for Goss Cove Landfill

A review of the FS provided the RAOs for the remedial action, the ARARs, and a summary of the remedial alternatives evaluated for the Site 8 soil OU. The review also provided the cost estimates for the remedial alternatives evaluated in the FS and O&M of the cap system.

A review of the ROD for Site 8 provided the selected remedy for the soil OU at Site 8. The remedy was an engineered control cap, institutional controls, groundwater monitoring, and O&M. The remedy will protect potential receptors from direct exposure to contaminated soil and prevent unacceptable risk to ecological receptors in the Thames River and Goss Cove from potential migration of contaminants. The ROD also indicated that no action is required for the sediment OU associated with Site 8.

A review of the Bidding Documents Submission of the Remedial Design provided the details of the design of the engineered control cap. The design includes the final cap components that were subsequently compared to the components included in the ROD. The design also includes a detailed cost estimate for the cap.

A review of New London Instruction 5090.18 provided the approach to be used for land use controls at NSB-NLON. The instruction details the restrictions on ground surface disturbance of soils or any subsurface disturbance of soils and/or groundwater at IR sites at NSB-NLON.

A review of the final Groundwater Monitoring Plan provided the monitoring well network to be used for the long-term groundwater monitoring program. The plan also details the analytical program, monitoring criteria, and data evaluation approach. The monitoring criteria to be used during the program are broken into two tiers. The first tier includes Connecticut SWPC and Volatilization Criteria and NSB-NLON background groundwater concentrations. The second tier includes National recommended Water Quality Criteria (WQC) and WQSS.

#### **8.4.3 ARAR and Site-Specific Action Level Changes**

The proposed remedy for soil at the Goss Cove Landfill includes an engineered control cap, institutional controls, groundwater monitoring, and O&M. ARARs and TBCs were reviewed to determine whether there have been changes since the remedial action and final Groundwater Monitoring Plan were completed. Listings of chemical-specific, location-specific, and action-specific ARARs, advisories and guidance (TBCs) which were considered in the ROD are listed on Tables 8-1, 8-2, and 8-3, respectively. With the exception of monitoring criteria, the ARARs were either addressed during construction or selection of the remedy and are no longer applicable, or have not been amended since the Remedial Action and final Groundwater Monitoring Plan. Changes associated with monitoring criteria are addressed in the response to Question 2 of Section 8.5, Assessment.

## 8.5 ASSESSMENT

The following conclusions support the determination that the remedy at Site 8 is expected to be protective of human health and the environment upon completion.

### ***Question 1. Is the remedy functioning as intended by the decision documents?***

- ***HASP/Contingency Plan:*** A groundwater monitoring program will be implemented at Site 8. The results of the program will be used to evaluate the cap's performance regarding minimizing contaminant migration. Should groundwater data indicate the need to evaluate additional remedial actions at some point in the future, the Navy will perform the evaluation at that time.
- ***Implementation of Institutional Controls and Other Measures:*** Institutional controls associated with Site 8 are discussed in the New London Instruction 5090.18. The Navy will implement these controls. Access to the site is restricted by perimeter fencing when the museum is closed.
- ***Remedial Action Performance:*** An engineered landfill cap system was installed at Site 8. It is anticipated that it will be effective in limiting direct exposure if proper O&M is conducted at the site and it will minimize contaminant migration from the site. A groundwater monitoring program will be implemented in the winter of 2001 to evaluate the cap's performance regarding minimizing contaminant migration.
- ***System Operations/O&M:*** Installation of the engineered landfill cap system was completed in June 2001; therefore, no information is available regarding system operations or O&M. An O&M plan should be prepared and implemented.
- ***Cost of Operations/O&M:*** Not available at this time.
- ***Opportunities for Optimization:*** Installation of the engineered landfill cap system was completed in June 2001; therefore, no opportunities for optimization can be discussed at this time.
- ***Early Indicators of Potential Remedy Failure:*** Installation of the engineered landfill cap system was completed in June 2001; therefore, there are no indicators of potential remedy failure.

***Question 2. Are the assumptions used at the time of the remedy selection still valid?***

- ***Changes in Standards and To Be Considereds:*** The primary monitoring criteria for the Area A Landfill are the site-specific SWPC and Connecticut SWPC. The secondary monitoring criteria for the Area A Landfill are the lower of the Federal AWQCs and the Connecticut WQSSs. The primary and secondary criteria have not changed since the groundwater monitoring plan was issued.
- ***Changes in Exposure Pathways:*** An engineered cap system was installed at Site 8 that eliminated the direct exposure pathway for human or ecological receptors to come into contact with the soil related to Site 8. This change was planned as part of the remedial action. There were no other changes in the site conditions that affect exposure pathways (i.e., there are no current or planned changes in land use and no new contaminants, sources, or routes of exposure were identified).
- ***Changes in Toxicity and Other Contaminant Characteristics:*** Toxicity and other factors for contaminants of concern have not changed.
- ***Changes in Risk Assessment Methodologies:*** As discussed in Section 1.4, human health risk assessment methodologies have not changed since the ROD and final Groundwater Monitoring Plan were issued. In addition, as presented in Section 1.4, no significant changes have occurred in the ecological risk assessment methodology since the ERA was conducted.

***Question 3. Has any other information come to light that could call into question the protectiveness of the remedy?***

No additional information has been identified that would call into question the protectiveness of the remedy.

## **8.6 DEFICIENCIES**

No deficiencies were discovered during the five-year review for Site 8. The remedial action was not fully implemented at Site 8 at the time of the April 2001 site inspection. The remedial action was subsequently completed in June 2001. A better evaluation of site deficiencies will be provided in the second Five Year Review Report.

## **8.7 RECOMMENDATIONS AND REQUIRED ACTIONS**

Based on the results of the site inspection and review, the following recommendations and actions are required for Site 8.

- Complete preparation of the Final Report for the Remedial Action at Goss Cove Landfill.
- Implement the Groundwater Monitoring Plan and prepare an appropriate decision document for the groundwater OU when sufficient data has been collected.
- Prepare a NFA Decision Document for the surface water OU.
- Prepare and implement an O&M plan.
- Enforce the New London Instruction 5090.18.

## **8.8 PROTECTIVENESS STATEMENT**

The remedy for the Site 8 soil OU is protective of human health and the environment. The source of contamination is contained. The engineered cap minimizes infiltration and subsequent contaminant migration, as well as prevents direct contact with soil. A groundwater monitoring program will be implemented to verify that the cap is performing as planned. Land use controls and O&M of the cap will maintain the effectiveness of the remedy into the future.

**TABLE 8-1**

**CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS, ADVISORIES, AND GUIDANCE  
SITE 8 - GOSS COVE LANDFILL  
NAVAL SUBMARINE BASE NEW LONDON  
GROTON, CONNECTICUT**

<b>Requirement</b>	<b>Citation</b>	<b>Requirement Synopsis</b>	<b>Current Status / Applicability</b>
<b>FEDERAL</b>			
EPA Human Health Cancer Slope Factors (CSFs)		CSFs are guidance values used to evaluate the potential carcinogenic hazard caused by exposure to contaminants.	The selected remedy prevents exposure to contaminated media and thereby minimizes human health concerns, although any changes to the cap in the future could allow exposure.
EPA Reference Dose (RfDs)		RfDs are guidance values use to evaluate the potential noncarcinogenic hazard caused by exposure to contaminants.	The selected remedy prevents exposure to contaminated media and thereby minimizes human health concerns, although any changes to the cap in the future could allow exposure.
<b>STATE OF CONNECTICUT</b>			
Remediation Standard Regulations	RCSA Section 22a-133k-1 through 3  (Established pursuant to CGS Section 22a-133k)	These regulations provide specific numeric cleanup criteria for a wide variety of contaminants in soil, groundwater, and soil vapor. The regulations include a procedure for establishing criteria where none exist for a particular contaminant and for establishing criteria where those specified in the regulation are not appropriate.	The selected remedy complies with these standards because of employment of the engineered control. Changes in action levels for groundwater are addressed in Section 8.5.

TABLE 8-2

**LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS, ADVISORIES, AND GUIDANCE  
SITE 8 - GOSS COVE LANDFILL  
NAVAL SUBMARINE BASE NEW LONDON  
GROTON, CONNECTICUT  
PAGE 1 OF 2**

Requirement	Citation	Requirement Synopsis	Current Status / Applicability
<b>FEDERAL</b>			
Executive Order 11988 RE: Floodplain Management	Executive Order 11988	Requires federal agencies, wherever possible, to avoid or minimize adverse impacts upon floodplains. Requires reduction of risk of flood loss, minimization of the impact of floods on human safety, health and welfare, and restoration and preservation of natural and beneficial values of floodplains.	Measures were taken to minimize impacts to Thames River floodplain during remedial activities. Remedial activities did not take place during periods of flooding. Now that the cap construction has been completed, this requirement is no longer applicable.
Fish and Wildlife Conservation Act	16 USC Part 661 <i>et seq.</i> ; 40 CFR Section 6.302	Requires action to be taken to protect fish and wildlife from projects affecting streams or rivers.	This regulation was addressed during construction. Now that the cap construction has been completed, this requirement is no longer applicable.
Coastal Zone Management Act	16 USC Parts 1451 <i>et seq.</i>	This act requires that any actions must be conducted in a manner consistent with state approved management programs.	This regulation was addressed during construction. Now that the cap construction has been completed, this requirement is no longer applicable.



TABLE 8-2

**LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS, ADVISORIES, AND GUIDANCE  
SITE 8 - GOSS COVE LANDFILL  
NAVAL SUBMARINE BASE NEW LONDON  
GROTON, CONNECTICUT  
PAGE 2 OF 2**

Requirement	Citation	Requirement Synopsis	Current Status / Applicability
<b>STATE OF CONNECTICUT</b>			
Coastal Management Act	CGS 22a-90 to 112	Requires facilities activities conducting activities within the coastal zone to submit a coastal site plan to the municipality. The municipality uses the coastal site plan to determine whether the proposed activity poses unacceptable impact on coastal resources and future water-dependent activities. The municipality may require that all reasonable measures be taken to mitigate such adverse impacts.	Extraction/capping was conducted using approved management programs to minimize impacts to the Thames River. Now that the cap construction has been completed, this requirement is no longer applicable.
CT Endangered Species Act	CGS 26-303 to 314	Regulates activities affecting state-listed endangered or threatened species or their critical habitat.	The state-threatened Atlantic Sturgeon inhabits the Thames River. Excavation/capping activities were conducted with minimal impact on the Thames River and any potential habitats. Now that the cap construction has been completed, this requirement is no longer applicable.

TABLE 8-3

**ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS, ADVISORIES, AND GUIDANCE**  
**SITE 8 - GOSS COVE LANDFILL**  
**NAVAL SUBMARINE BASE NEW LONDON**  
**GROTON, CONNECTICUT**  
**PAGE 1 OF 2**

Requirement	Citation	Requirement Synopsis	Current Status / Applicability
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**FEDERAL**

Clean Water Act, Section 402, National Pollution Discharge Elimination System (NPDES)	40 CFR 122 through 125, 131	NPDES (National Pollution Discharge Elimination System) permits are required for any discharges to navigable waters. If remedial activities include such a discharge, the NPDES standards would be ARARs.	This regulation was addressed during construction. Now that the cap construction has been completed, this requirement is no longer applicable.
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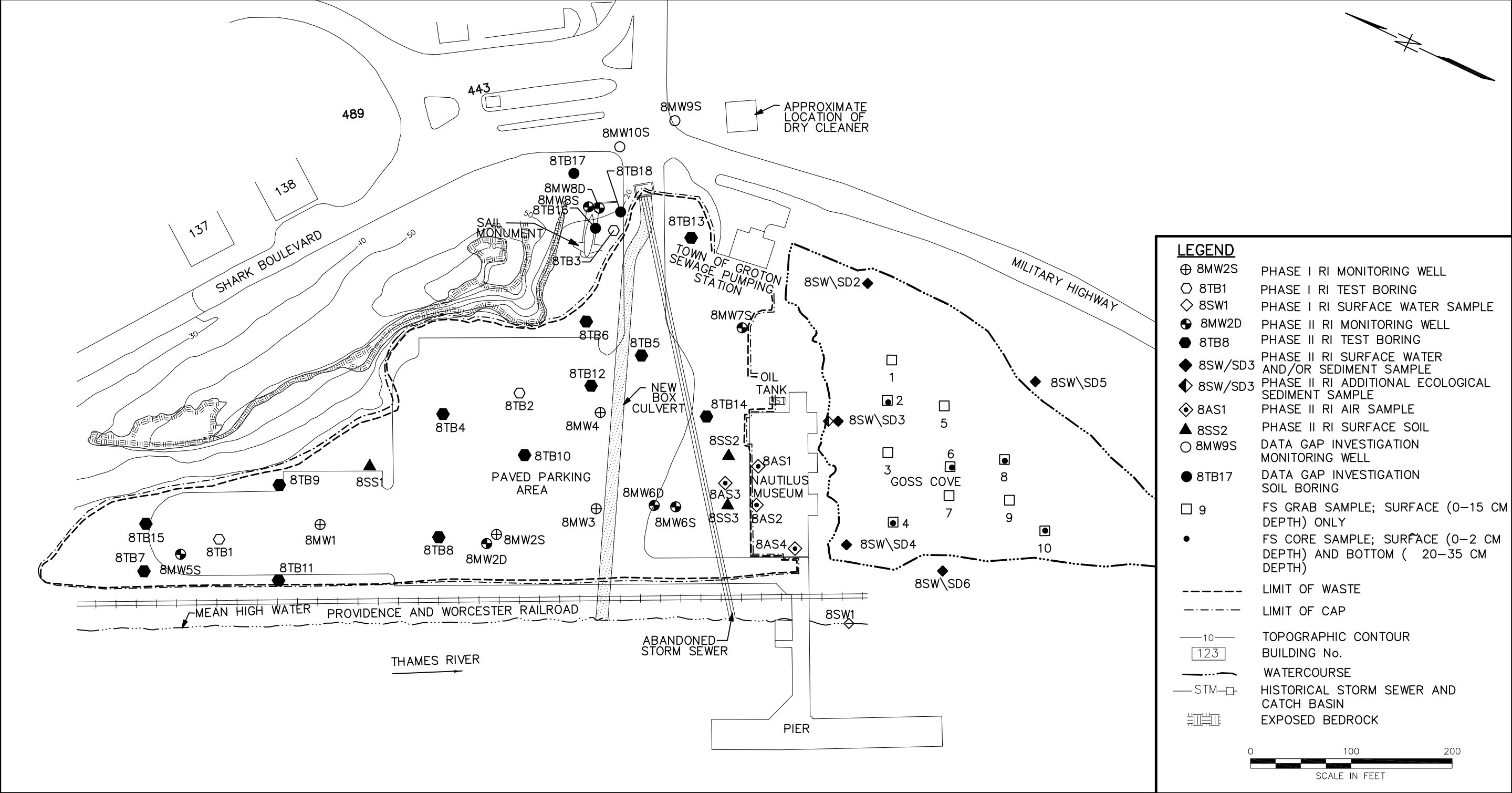
**STATE OF CONNECTICUT**


Hazardous Waste Management: Generator and Handler Requirements	RCSA § 22a-449(c) 100-101	These sections establish standards for listing and identification of hazardous waste. The standards of 40 CFR 260-261 are incorporated by reference.	This regulation was addressed during construction. Now that the cap construction has been completed, this requirement is no longer applicable.
Hazardous Waste Management: Generator Standards	RCSA § 22a-449(c)-102	This section establishes standards for various classes of generators. The standards of 40 CFR 262 are incorporated by reference. Storage requirements given at 40 CFR 265.15 are also included.	This regulation was addressed during construction. Now that the cap construction has been completed, this requirement is no longer applicable.
Closing of Solid Waste Facilities	RCSA § 22a-209-13	This section establishes standards for closure of solid waste facilities.	This regulation was addressed during construction. These regulations have not been amended since 1996; therefore compliance is current.

TABLE 8-3

**ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS, ADVISORIES, AND GUIDANCE  
SITE 8 - GOSS COVE LANDFILL  
NAVAL SUBMARINE BASE NEW LONDON  
GROTON, CONNECTICUT  
PAGE 2 OF 2**

Requirement	Citation	Requirement Synopsis	Current Status / Applicability
<b>STATE OF CONNECTICUT (Continued)</b>			
Air Pollution Control	RCSA § 22a-174-1 through 29	These regulations require permits to construct and to operate specified types of emission sources and contain emission standards that must be met prior to issuance of a permit. Pollutant abatement controls may be required. Specific standards pertain to fugitive dust (18b) and control of odors (23).	This regulation was addressed during construction. Now that the cap construction has been completed, this requirement is no longer applicable.
Guidelines for Soil Erosion and Sediment Control	The Connecticut Council on Soil and Water Conservation	The guidelines provide technical and administrative guidance for the development, adoption, and implementation of erosion and sediment control program.	This regulation was addressed during construction. Now that the cap construction has been completed, this requirement is no longer applicable.
Water Pollution Control	RCSA § 22a-430-1 through 8	These rules establish permitting requirements and criteria for water discharge to surface water.	This regulation was addressed during construction. Now that the cap construction has been completed, this requirement is no longer applicable.
Water Quality Standards	CGS 22a-426	Connecticut's Water Quality Standards establish specific numeric criteria, designated uses, and anti-degradation policies for groundwater and surface water.	Remedial activities, including the disposal groundwater from excavations, were undertaken in a manner that was consistent with the antidegradation policy in the Water Quality. Standards are currently being used to evaluate monitoring results to determine if further remedial action is required to protect resources. Changes in groundwater quality criteria are addressed in Section 8.5.



NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES	DRAWN BY HJP	DATE 5/10/01	 Tetra Tech NUS, Inc.	CONTRACT NO. 2863	OWNER NO. 0816
							CHECKED BY	DATE		APPROVED BY	DATE
							COST/SCHED-AREA			APPROVED BY	DATE
							SCALE AS NOTED			DRAWING NO.	REV.
										FIGURE 8-1	0
									SITE MAP SITE 8-GOSS COVE LANDFILL NSB-NLON, GROTON, CONNECTICUT		

## 9.0 SITE 9 – OT-5

This five-year review is being conducted for Site 9 as a matter of policy since a removal action has taken place under RCRA for the soil OU, but a remedy for the groundwater under CERCLA has not been completed. The soil at Site 9 was investigated and remediated under the CTDEP RCRA UST Program; therefore, no decision documents have been prepared for the soil OU. Groundwater associated with the site is currently being investigated under CERCLA.

### 9.1 HISTORY AND SITE CHRONOLOGY

A list of important Site 9 historical events and relevant dates in the site chronology is shown below. The identified events are illustrative, not comprehensive.

Event	Date
Crystal Lake drained and dredged to allow for construction of nine concrete USTs.	1940s
Waste OT-5 converted to storage tank for bilge water.	1970s
Use of OT-5 stopped and tank contents were removed.	1993
Removal action and post-removal action sampling at OT-5.	1994
Post Removal Action Report for OT-5	1994
Draft Final Basewide Groundwater Operable Unit Remedial Investigation	August 2001

### 9.2 BACKGROUND

Site 9, Waste Oil Tank (OT-5), was an underground, concrete storage tank located between Sculpin Avenue and Tang Avenue in the southern portion of NSB-NLON. The investigations at Site 9 were conducted under the CTDEP RCRA UST Program. The site map is included as Figure 9-1. The site's location relative to other IR sites is shown on Figure 1-2. The tank had a diameter of approximately 112 feet and was 11 feet deep. The top of the tank was approximately 5 feet below the ground surface. The tank had a capacity of approximately 750,000 gallons.

The tank was constructed in the 1940s and was used to store fuel oil. In the late 1970s, the tank was converted to a storage tank for bilge water and other waste solutions. Use of OT-5 was stopped in 1993 and all tank contents, including floating product and most of the settled sludge, were removed (HNUS, 1994a). A residual sludge layer of approximately 2 to 3 inches was left in the tank during purging. This sludge contained PCBs at concentrations exceeding 500 mg/kg (HNUS, 1994a).

After OT-5 was emptied, groundwater infiltrated through cracks in the concrete surface and partially refilled the tank (HNUS, 1994a). Subsurface contamination of the surrounding soil and groundwater may have been caused by draining of the infiltrated water through the cracks and into the surrounding media.

In 1993, a majority of the contents of OT-5, including the floating product layer, water, and sludge were removed and disposed off site. Residual materials contained in OT-5 were later removed and stored on site as follows:

<u>Storage Vessel</u>	<u>Contents</u>
Frac Trailer No. 1	6,000 gallons of waste decontamination fluid
Frac Trailer No. 2	19,000 gallons of OT-5 bottom sludge
Roll-Off Container No. 1	20,000 pounds of bottom sludge, waste wipe cloths, discarded personal protective equipment (PPE)
Roll-Off Container No. 2	20,000 pounds bottom sludge, waste wipe cloths, discarded PPE

The primary waste contaminants were PCBs at concentrations in excess of 500 mg/kg.

In April 1994, B&R Environmental completed a removal action of these materials and then performed Post-Removal Action sampling that confirmed the residual waste materials had been properly shipped and disposed and that the waste storage vessels had been properly decontaminated (HNUS, 1994b). After the contents of OT-5 were removed, the tank was cleaned and the top of the tank was crushed. The tank was closed in place by filling it with inert material.

Site 9 is located within the Tank Farm (Site 23). Further discussion of the ongoing investigation being conducted on the groundwater OU at Site 23 under the CERCLA program is provided in Section 22.

## **9.3 REMEDIAL ACTIONS**

### **9.3.1 Remedy Selection**

No RODs have been signed for OT-5. In April 1994, the Navy requested that HNUS complete the removal and disposal of the OT-5 waste still stored on site. The majority of the waste was an oily sludge removed from the bottom of OT-5. The main contaminants of concern in the OT-5 bottom sludge were PCBs with concentrations reaching in excess of 500 mg/kg. Other wastes stored on site included spent decontamination fluids, waste diaper-like wipe cloths, and discarded PPE used during the OT-5 closure activities. The objectives were to remove, ship, and dispose all wastes, decontamination of the waste storage vessels, and conduct verification sampling and analysis.

### 9.3.2 Remedy Implementation

In 1994, HNUS completed a removal action at OT-5. The task included the removal and disposal of PCB-contaminated sludge at OT-5. Removal of the OT-5 waste materials from the frac trailers and roll-off containers and off-site disposal of these waste materials were initiated by the RAC on July 21, 1994 and concluded on August 16, 1994. The waste stored inside the two frac trailers and the two roll-off containers was removed in accordance with the procedure described in the Removal Action Work Plan (HNUS, 1994b).

The liquid portion of the waste was aspirated from the frac trailers and roll-off containers into a PCB-dedicated vacuum trailer that was also used to ship the waste for off-site incineration and disposal at the Aptus facility located in Aragonite, Utah. A total of 7 vacuum trailer loads were removed from the frac trailers and roll-off containers and shipped to Aptus.

The solid portion of the waste was consolidated into one of the two roll-off containers and shipped in that container for off-site incineration and disposal to the Aptus facility. The empty roll-off container was then returned to the site for decontamination.

Each waste load was weighed on site prior to departure and again upon arrival at the Aptus facility. A Uniform Hazardous Waste Manifest and Notification of Waste Subject to Land Disposal Restriction were prepared for each waste shipment.

Following waste removal, the inside surfaces of the frac trailers and roll-off containers were decontaminated, and wipe samples were collected for verification purposes from inside surfaces. The trailers and containers were decontaminated repeatedly until the PCB concentrations from the wipe samples were below the required  $10 \mu\text{g}/100 \text{ cm}^2$ . The Post Removal Action Report (HNUS, 1994b) presents the results of the verification sampling and analysis procedures performed by HNUS to verify that clean-up standards were met for the decontamination of the containers used for the temporary on-site storage of the PCB-contaminated sludge removed from OT-5.

After the contents of OT-5 were removed, the tank was cleaned and the top of the tank was crushed. The tank was closed in place by filling it with inert material. No further remedial action is necessary for soil to ensure protection of human health and the environment at Site 9. The removal action eliminated the need to conduct additional remedial action. Groundwater associated with Site 9 will be addressed under Site 23 as part of the Basewide Groundwater OU RI for NSB-NLON under a separate ROD.

## 9.4 FIVE-YEAR REVIEW FINDINGS

### 9.4.1 Site Inspection

A site inspection conducted at Site 9 on April 10, 2001 included visual observations of the Tank Farm area, which is currently used as a recreational area (softball fields, jogging track, etc.). Representatives of the Navy, USEPA, CTDEP, and TtNUS participated in the inspection. Conditions during the inspection were favorable, with mild temperatures and no precipitation. The Site 9 area within the Tank Farm was not specifically inspected during the site inspection. The site was subsequently visited in August 2001 and photos of the site were taken during the visit. Appendix A contains photographs taken of the Site 9 (OT-5) area.

Site 9 is contained within Site 23, which is within a partially fenced area that is currently used for recreation. Groundwater at the Tank Farm is not used for human consumption and it is not likely to be used for human consumption in the foreseeable future because of its current classification (i.e., GB groundwater that indicates that it is not suitable for direct human consumption without treatment). There is no short-term or long-term plan to convert this area to any other use.

### 9.4.2 Document and Analytical Data Review

The Post-Removal Action Report for Waste Oil Tank No. 5 Removal Action was reviewed for this five year review. The report summarized the following information.

- Provided a brief overview of the removal action activities, including waste removal, shipment, and disposal; decontamination of the waste storage vessels; and verification sampling and analysis.
- Presented copies of the documents that verify that the wastes were properly shipped and disposed.
- Presented the results of the post-removal action verification sampling and analysis program that showed that the waste storage vessels were properly decontaminated (i.e. the PCB concentrations on the inside surfaces of the vessels did not exceed  $10 \mu\text{g}/100 \text{ cm}^2$ , as specified in 40 CFR 761.125).

### 9.4.3 ARAR and Site-Specific Action Level Changes

There have been no changes in ARARs that call into question the protectiveness of the remedy for soil. Groundwater at Site 9 is still being evaluated, and no decisions regarding the remediation of groundwater at this site have been determined.



## 9.5 ASSESSMENT

The following conclusions support the determination that the remedy at Site 9 is protective of human health and the environment.

### ***Question 1. Is the remedy functioning as intended by the decision documents?***

- ***HASP/Contingency Plan:*** Not applicable.
- ***Implementation of Institutional Controls and Other Measures:*** The Navy has an IR Site Use Restriction instruction in place as of October 2000 at NSB-NLON [SOPA (ADMIN) NLONINST 5090.18]. The policy restricts ground surface disturbance of soils or any subsurface disturbance of soils and/or groundwater at IR sites.
- ***Remedial Action Performance:*** All contaminated wastes were removed from OT-5 (Site 9) and the tank has been properly closed in place. Groundwater at Site 9 is being evaluated under Site 23.
- ***System Operations/O&M:*** Not applicable.
- ***Cost of Operations/O&M:*** Not applicable.
- ***Opportunities for Optimization:*** Not applicable.
- ***Early Indicators of Potential Remedy Failure:*** No early indicators of potential remedy failure were noted during the review.

### ***Question 2. Are the assumptions used at the time of the remedy selection still valid?***

- ***Changes in Standards and To Be Considereds:*** The remedial action conducted at Site 9 was done in accordance with RCRA UST regulations. Decontamination was completed to specifications included in 40 CRF 761.125.
- ***Changes in Exposure Pathways:*** There have been no changes in exposure pathways.
- ***Changes in Toxicity and Other Contaminant Characteristics:*** There have been no changes in toxicity and other factors for contaminants of concern that would call into question the protectiveness of the remedy.

- **Changes in Risk Assessment Methodologies:** A risk assessment was not conducted for Site 9.

**Question 3. Has any other information come to light that could call into question the protectiveness of the remedy?**

No additional information has been identified that would call into question the protectiveness of the remedy.

## **9.6 DEFICIENCIES**

A deficiency exists at Site 9 since a ROD was not completed and signed to document the remedial action that was conducted.

## **9.7 RECOMMENDATIONS AND REQUIRED ACTIONS**

It is recommended that an NFA PRAP and ROD be completed for Site 9. It is recommended that the decision for the groundwater OU be addressed under Site 23 (Tank Farm). Also, it is recommended that there be enforcement of the IR Site Use Restriction instruction.

## **9.8 PROTECTIVENESS STATEMENT**

The remedy at Site 9 is protective of human health and the environment. Current land use controls should minimize exposure to groundwater at the Tank Farm. In addition, the groundwater OU will be addressed in conjunction with Site 23.

